WHAT IS CLAIMED IS:

1. A rotary compressor comprising:

an electric element, and a rotary compression element driven by the electric element, both components being provided in a hermetically sealed container;

a cylinder constituting the rotary compression element, and a roller engaged with an eccentric portion formed in a rotary shaft of the electric element, and eccentrically rotated in the cylinder;

a vane abutted on the roller to divide an inside of the cylinder into a low pressure chamber side and a high pressure chamber side;

a spring member for always pressing the vane to the roller side;

a housing portion of the spring member, formed in the cylinder, and opened to the vane side and the hermetically sealed container side;

a plug positioned in the hermetically sealed container side of the spring member, and inserted into the housing portion to fit into a gap; and

an O ring attached around the plug to seal a part between the plug and the housing portion,

wherein a space between the cylinder and the hermetically sealed container is set smaller than a distance from the O ring to an end of the plug on the hermetically sealed container side.

2. A rotary compressor comprising:

an electric element, and first and second rotary compression elements driven by the electric element, these components being provided in a hermetically sealed container, gas compressed by the first rotary compression element being discharged into the hermetically sealed container, and the discharged gas of intermediate pressure being further compressed by the second rotary compression element;

a cylinder constituting the second rotary compression element, and a roller engaged with an eccentric portion formed in a rotary shaft of the electric element, and eccentrically rotated in the cylinder;

a vane abutted on the roller to divide an inside of the cylinder into a low pressure chamber side and a high pressure chamber side;

a spring member for always pressing the vane to the roller side;

a housing portion of the spring member, formed in the cylinder, and opened to the vane side and the hermetically sealed container side;

a plug positioned in the hermetically sealed container side of the spring member, and inserted into the housing portion to fit into a gap; and

an O ring attached around the plug to seal a part between the plug and the housing portion,

wherein a space between the cylinder and the

hermetically sealed container is set smaller than a distance from the O ring to an end of the plug on the hermetically sealed container side.

3. A rotary compressor comprising:

an electric element, and a rotary compression element driven by the electric element, both components being provided in a hermetically sealed container;

a cylinder constituting the rotary compression element, and a roller engaged with an eccentric portion formed in a rotary shaft of the electric element, and eccentrically rotated in the cylinder;

a support member adapted to seal an opening surface of the cylinder, and provided with a bearing of the rotary shaft:

a vane abutted on the roller to divide an inside of the cylinder into a low pressure chamber side and a high pressure chamber side;

a spring member for always pressing the vane to the roller side;

a housing portion of the spring member, formed in the cylinder, and opened to the vane side and the hermetically sealed container side; and

a plug positioned in the hermetically sealed container side of the spring member, and pressed into and fixed in the housing portion,

wherein the support member of a part corresponding

to the plug includes a roll off concaved in a direction away from the cylinder.

4. A rotary compressor comprising:

an electric element, and first and second rotary compression elements driven by the electric element, these components being provided in a hermetically sealed container, gas compressed by the first compression element being discharged into the hermetically sealed container, and the discharged gas of intermediate pressure being further compressed by the second rotary compression element;

a cylinder constituting the second rotary compression element, and a roller engaged with an eccentric portion formed in a rotary shaft of the electric element, and eccentrically rotated in the cylinder;

a vane abutted on the roller to divide an inside of the cylinder into a low pressure chamber side and a high pressure chamber side;

a support member adapted to seal an opening surface of the cylinder, and provided with a bearing of the rotary shaft;

a spring member for always pressing the vane to the roller side;

a housing portion of the spring member, formed in the cylinder, and opened to the vane side and the hermetically sealed container side; and

a plug positioned in the hermetically sealed

container side of the spring member, and pressed into and fixed in the housing portion,

wherein the support member of a part corresponding to the plug includes a roll off concaved in a direction away from the cylinder.

5. The rotary compressor according to any one of claims 1 to 4, wherein the rotary compression element compresses CO_2 gas as a refrigerant.

6. A rotary compressor comprising:

an electric element, and first and second rotary compression elements driven by the electric element, these components being provided in a hermetically sealed container, gas compressed by the first rotary compression element being discharged into the hermetically sealed container, and the discharged gas of intermediate pressure being further compressed by the second rotary compression element;

cylinders constituting the respective rotary compression elements;

an intermediate diaphragm provided between the cylinders to partition each rotary compression element;

a support member adapted to seal an opening surface of each cylinder, and provided with a bearing of a rotary shaft; and

an oil hole formed in the rotary shaft,

wherein the intermediate diaphragm includes an oil

supply path for communicating the oil hole with a suction side of the second rotary compression element.

7. The rotary compressor according to claim 6, wherein the oil supply path is constructed by boring a through-hole in the intermediate diaphragm to communicate an outer peripheral surface with an inner peripheral surface of the rotary shaft side, and a communication hole for sealing an opening of the through-hole on the outer peripheral side, and communicating the through-hole with the suction side is bored on the cylinder for constituting the second rotary compression element.

8. A rotary compressor comprising:

an electric element, and first and second rotary compression elements driven by the electric element, these components being provided in a hermetically sealed container, CO_2 refrigerant gas compressed by the first rotary compression element being discharged into the hermetically sealed container, and the discharged refrigerant gas of intermediate pressure being further compressed by the second rotary compression element;

a cylinder constituting the second rotary compression element;

a support member adapted to seal an opening surface of the cylinder, and provided with a bearing of a rotary shaft erected on a center part;

a discharge muffler chamber formed in the support member outside the bearing, and communicated with an inside of the cylinder;

a cover having a peripheral part fixed to the support member by a bolt to seal an opening of the discharge muffler chamber;

a gasket held between the cover and the support member; and

an O ring provided between an inner peripheral end surface of the cover and an outer peripheral surface of the bearing.

9. A rotary compressor comprising:

an electric element, and first and second rotary compression elements driven by the electric element, these components being provided in a hermetically sealed container, CO_2 refrigerant gas compressed by the first rotary compression element being discharged into the hermetically sealed container, and the discharged refrigerant gas of intermediate pressure being further compressed by the second rotary compression element;

a cylinder constituting the second rotary compression element;

a support member adapted to seal an opening surface of the cylinder on the electric element side, and provided with a bearing of a rotary shaft erected on a center part;

a discharge muffler chamber formed in the support

member outside the bearing, and communicated with an inside of the cylinder; and

a cover attached to the support member to seal an opening of the discharge muffler chamber,

wherein a thickness dimension of the cover is set to ≥2 mm to ≤10 mm.

10. The rotary compressor according to claim 9, wherein a thickness of the cover is set to 6 mm.

11. The rotary compressor according to claim 9 or 10, wherein the cover has a peripheral part fixed to the support member by a bolt, a gasket is held between the cover and the support member, and an O ring is provided between an inner peripheral end surface of the cover and an outer surface of the bearing.

12. A rotary compressor comprising:

an electric element, and first and second rotary compression elements driven by the electric element, these components being provided in a hermetically sealed container, CO_2 refrigerant gas compressed by the first rotary compression element being discharged into the hermetically sealed container, and the discharged refrigerant gas of intermediate pressure being further compressed by the second rotary compression element;

a cylinder constituting each rotary compression

element;

a support member adapted to seal an opening surface of each cylinder, and provided with a bearing of a rotary shaft erected on a center;

a discharge muffler chamber formed in the support member outside the bearing, and communicated with an inside of the cylinder; and

a cover attached to the support member to seal an opening of the discharge muffler chamber,

wherein each cylinder, each support member and each cover are fastened by a plurality of main bolts, and each cylinder and each support member are fastened by auxiliary bolts located outside the main bolts.

13. The rotary compressor according to claim 12, further comprising a roller engaged with an eccentric portion formed in the rotary shaft of the electric element, and eccentrically rotated in the cylinder constituting the second rotary compression element, a vane abutted on the roller to divide an inside of the cylinder into a low pressure chamber side and a high pressure chamber side, and a guide groove formed in the cylinder to house the vane,

wherein the auxiliary bolts are positioned near the guide groove.

14. A rotary compressor comprising:

an electric element, and first and second rotary

compression elements driven by the electric element, these components being provided in a hermetically sealed container, and gas compressed by the first rotary compression element being compressed by the second rotary compression element;

first and second cylinders constituting the first and second rotary compression elements; and

first and second rollers engaged with eccentric portions formed in a rotary shaft of the electric element to have a phase difference of 180°, and eccentrically rotated in the respective cylinders,

wherein a section of a connecting portion for connecting both eccentric portions with each other is formed in a shape having a thickness larger in a direction orthogonal to an eccentric direction than that in the eccentric direction of each of the eccentric portions, a side face of the connecting portion in the eccentric direction side of the first eccentric portion is formed in a circular-arc shape of the same center as that of the second eccentric portion, and a side face in the eccentric direction of the second eccentric portion is formed in a circular-arc shape of the same center as that of the first eccentric portion.

15. A hermetically sealed compressor comprising:

an electric element, and a compression element driven by the electric element, both components being provided in a hermetically sealed container, a CO_2 refrigerant sucked from a refrigerant introduction tube being

compressed by the compression element, discharged into the hermetically sealed container, and then discharged outside from a refrigerant discharge tube;

a sleeve provided in the hermetically sealed container, to which the refrigerant introduction tube and the refrigerant discharge tube are connected; and

a flange formed around an outer surface of the sleeve to engage a coupler for pipe connection.

16. A hermetically sealed compressor comprising:

an electric element, and a compression element driven by the electric element, both components being provided in a hermetically sealed container, a CO_2 refrigerant sucked from a refrigerant introduction tube being compressed by the compression element, discharged into the hermetically sealed container, and then discharged outside from a refrigerant discharge tube;

a sleeve provided in the hermetically sealed container, to which the refrigerant introduction tube and the refrigerant discharge tube are connected; and

a screw groove formed for pipe connection around an outer surface of the sleeve.

17. A hermetically sealed compressor comprising:

an electric element, and a compression element driven by the electric element, both components being provided in a hermetically sealed container, a CO_2

refrigerant sucked from a refrigerant introduction tube being compressed by the compression element, discharged into the hermetically sealed container, and then discharged outside from a refrigerant discharge tube;

a plurality of sleeves provided in the hermetically sealed container, to which the refrigerant introduction tube and the refrigerant discharge tube are connected;

a flange formed around an outer surface of one of adjacent sleeves to engage a coupler for pipe connection; and

a screw groove formed for pipe connection around an outer surface of the other sleeve.

18. A compressor comprising:

an electric element, and a compression element driven by the electric element, both components being provided in a container;

a container side bracket provided in a side face of the container;

an accumulator; and

an accumulator side bracket, to which the accumulator is attached,

wherein by fixing the accumulator side bracket to the container side bracket, the accumulator is attached to the container through both brackets.

19. The compressor according to claim 18, wherein the accumulator side bracket is attached to a center or a

position of a center of gravity of the accumulator, or in the vicinity thereof.

20. A compressor comprising:

an electric element, and first and second compression elements driven by the electric element, these components being provided in a hermetically sealed container;

a refrigerant introduction tube for introducing a refrigerant to the first compression element;

a refrigerant tube for introducing refrigerant gas compressed by the first compression element to the second compression element; and

a refrigerant tube for discharging high pressure gas compressed by the second compression element,

wherein the refrigerant tubes of the first and second compression elements are connected to the hermetically sealed container, and laid around in opposing directions from the hermetically sealed container.

21. The compressor according to claim 20, wherein the refrigerant tube of the first compression element is connected to the hermetically sealed container in a position below the refrigerant tube of the second compression element, an accumulator is arranged above a connecting position of each refrigerant tube to the hermetically sealed container, and the accumulator is connected to the refrigerant tube for introducing the refrigerant to the first compression element.

22. A compressor comprising:

an electric element, and first and second compression elements driven by the electric element, these components being provided in a hermetically sealed container;

a first refrigerant introduction tube for sucking refrigerant gas, the refrigerant gas being compressed by the first compression element, and discharged into the hermetically sealed container; and

a second refrigerant introduction tube located outside the hermetically sealed container for sucking the discharged refrigerant gas of intermediate pressure, the refrigerant gas being compressed by the second compression element,

wherein the first and second refrigerant introduction tubes are connected to the hermetically sealed container in adjacent positions, and laid around in opposing directions from the hermetically sealed container.

23. The compressor according to claim 22, wherein the first refrigerant tube is connected to the hermetically sealed container in a position below the second refrigerant tube, an accumulator is arranged above a connecting position of each refrigerant introduction tube to the hermetically sealed container, and the accumulator is connected to the first refrigerant introduction.

24. A hermetically sealed compressor comprising:

an electric element, and a compression element driven by the electric element, both components being provided in a hermetically sealed container, a refrigerant being compressed by the compression element, and discharged into the hermetically sealed container;

a terminal attached to an end cap of the hermetically sealed container; and

a step having a predetermined curvature formed by seat pushing in the end cap around the terminal.

25. The hermetically sealed compressor according to claim 24, wherein the end cap is formed in a rough bowl shape, the step has a shape axially symmetrical around a center axis of the end cap, and the terminal is attached to a center of the end cap.

26. The hermetically sealed compressor according to claim 24 or 25, wherein the compression element compresses CO_2 gas as a refrigerant.

27. A hermetically sealed compressor comprising:

an electric element, and a compression element driven by the electric element, both components being provided in a hermetically sealed container, a CO_2 refrigerant being compressed by the compression element, and discharged into the hermetically sealed container; and

a terminal attached to the hermetically sealed container,

wherein the terminal includes a circular glass portion, which an electric terminal penetrates to be attached, and a flange-shaped metal attaching portion formed around the glass portion , and welded to an attaching hole peripheral edge part of the hermetically sealed container, and a thickness dimension of the attaching portion is set in a range of 2.4±0.5 mm.

28. A hermetically sealed compressor comprising:

an electric element, and first and second rotary compression elements driven by the electric element, these components being provided in a hermetically sealed container, CO_2 refrigerant gas compressed by the first rotary compression element being discharged into the hermetically sealed container, and the discharged refrigerant gas of intermediate pressure being further compressed by the second rotary compression element; and

a terminal connected to the hermetically sealed container,

wherein the terminal includes a circular glass portion, which an electric terminal penetrates to be attached, and a flange-shaped metal attaching portion formed around the glass portion, and welded to an attaching hole peripheral edge part of the hermetically sealed container, and a thickness dimension of the attaching portion is set in a

range of 2.4±0.5 mm.

29. A rotary compressor comprising:

an electric element, and a rotary compression element driven by the electric element, both components being provided in a hermetically sealed container;

a single or a plurality of cylinders constituting the rotary compression element;

a first support member adapted to seal an opening surface of the cylinder on the electric element side, and provided with a bearing of a rotary shaft of the electric element;

a second support member adapted to seal an opening surface of the cylinder on the electric element side, and provided with a bearing of the rotary shaft; and

a carbon bush provided between one of the bearings of the first and second support members and the rotary shaft.

30. The rotary compressor according to claim 29, wherein the bush is provided in the bearing of the first support member.

31. A rotary compressor comprising:

an electric element, and first and second rotary compression elements driven by the electric element, both components being provided in a hermetically sealed container, gas compressed by the first rotary compression element being

discharged into the hermetically sealed container, and the discharged gas of intermediate pressure being further compressed by the second rotary compression element;

first and second cylinders respectively constituting the first and second rotary compression elements;

a first support member adapted to seal an opening surface of the first cylinder, and provided with a bearing of a rotary shaft of the electric element;

a second support member adapted to seal an opening surface of the second cylinder, and provided with a bearing of the rotary shaft; and

a carbon bush provided between one of the bearings of the first and second support members and the rotary shaft.

32. The rotary compressor according to claim 31, wherein the bush is provided in the bearing of the second support member.

33. The rotary compressor according to any one of claims 29 to 32, wherein the rotary compression element compresses CO_2 gas as a refrigerant.

34. A hermetically sealed compressor comprising:

an electric element, and a compression element driven by the electric element, both components being provided in a hermetically sealed container, a refrigerant sucked from a refrigerant introduction tube being compressed

by the compression element, and discharged from a refrigerant discharge tube; and

a sleeve attached corresponding to a hole formed on a bent surface of the hermetically sealed container, to which the refrigerant introduction and discharge tubes are connected;

wherein a flat surface is formed on an outer surface of the hermetically sealed container around the hole, the sleeve includes a insertion portion inserted into the hole, and an abutting portion positioned around the insertion portion and abutted on the flat surface of the hermetically sealed container, and the abutting portion of the sleeve and the flat surface of the hermetically sealed container are secured to each other by projection welding.

35. The hermetically sealed compressor according to claim 34, wherein the flat surface is concaved around the hole.

36. A rotary compressor comprising:

an electric element, and a rotary compression element driven by the electric element, both components being provided in a hermetically sealed container;

a cylinder constituting the rotary compression element, and a roller engaged with an eccentric portion formed in a rotary shaft of the electric element, and eccentrically rotated in the cylinder;

a support member adapted to seal an opening surface of the cylinder, and provided with a bearing of the rotary shaft;

a suction passage formed in the support member; and

a suction port formed in the cylinder in an inclined manner to communicate the suction passage with an inside of the cylinder corresponding to the suction passage of the support member,

wherein an edge part of the suction port on the suction port side is formed in a semicircular arc shape.

37. A method for manufacturing a rotary compressor, the rotary compressor including an electric element, a rotary compression element driven by the electric element, both components being provided in a hermetically sealed container, a cylinder constituting the rotary compression element, a roller engaged with an eccentric portion formed in a rotary shaft of the electric element, and eccentrically rotated in the cylinder, a support member adapted to seal an opening surface of the cylinder, and provided with a bearing of the rotary shaft, a suction passage formed in the support member, and a suction port formed in the cylinder in an inclined manner to communicate the suction passage with an inside of the cylinder corresponding to the suction passage of the support member,

the method comprising the step of:

processing the suction port by placing an end mill

having a flat tip perpendicularly to the cylinder, and moving the end mill in a direction of being inclined to the cylinder while the perpendicular state is maintained.

38. A method for manufacturing a rotary compressor, the rotary compressor including an electric element, a rotary compression element driven by the electric element, both components being provided in a hermetically sealed container, a cylinder constituting the rotary compression element, a roller engaged with an eccentric portion formed in a rotary shaft of the electric element, and eccentrically rotated in the cylinder, a support member adapted to seal an opening surface of the cylinder, and provided with a bearing of the rotary shaft, a discharge passage formed in the support member, and a discharge port formed in the cylinder in an inclined manner to communicate the discharge passage with an inside of the cylinder corresponding to the discharge passage of the support member,

the method comprising the step of:

processing the discharge port by placing a part of an end mill having a chevron tip shape perpendicularly to the cylinder.

39. A defroster of a refrigerant circuit, the refrigerant circuit including a compressor provided with an electric element, and first and second compression elements driven by the electric elements, these components being

provided in a hermetically sealed container, refrigerant gas compressed by the first compression element being discharged into the hermetically sealed container, and the discharged refrigerant gas of intermediate pressure being compressed by the second compression element, a gas cooler, into which a refrigerant discharged from the second compression element of the compressor flows, a pressure reducing device connected to an outlet side of the gas cooler, and an evaporator connected to an outlet side of the pressure reducing device, a refrigerant discharged from the evaporator being compressed by the first compression element,

the defroster comprising:

a defroster circuit for supplying a refrigerant discharged from the first compression element to the evaporator without reducing pressure; and

a flow path controller for controlling refrigerant distribution of the defroster circuit.

40. The defroster of the refrigerant circuit according to claim 39, wherein each of the compression elements compresses CO_2 gas as a refrigerant.

41. The defroster of the refrigerant circuit according to claim 39 or 40, wherein hot water is generated by heat radiation from the gas cooler.

42. A rotary compressor comprising:

an electric element, and first and second rotary compression elements driven by the electric element, these components being provided in a hermetically sealed container, gas compressed by the first rotary compression element being discharged into the hermetically sealed container, and the discharged gas of intermediate pressure being further compressed by the second rotary compression element;

first and second cylinders respectively constituting the first and second rotary compression elements;

an intermediate diaphragm provided between the cylinders to partition each rotary compression element;

a support member adapted to seal an opening surface of each cylinder, and provided with a bearing of a rotary shaft; and

an oil hole formed in the rotary shaft,

wherein the intermediate diaphragm includes an oil supply groove for communicating the oil hole with a low pressure chamber in the second cylinder on a surface on the second cylinder side.

43. A refrigeration unit comprising:

a refrigerant closed circuit formed by communicating at least a compressor, a radiator and an evaporator through a refrigerant tube, and filled with carbon dioxide; and

an oil separator provided in the refrigerant closed circuit,

wherein an oil storage portion of the oil separator

and the compressor are connected to each other through a return oil tube.

44. The refrigeration unit according to claim 43, wherein the oil separator is provided in an outlet side refrigerant circuit of the radiator or an outlet side refrigerant circuit of the evaporator.